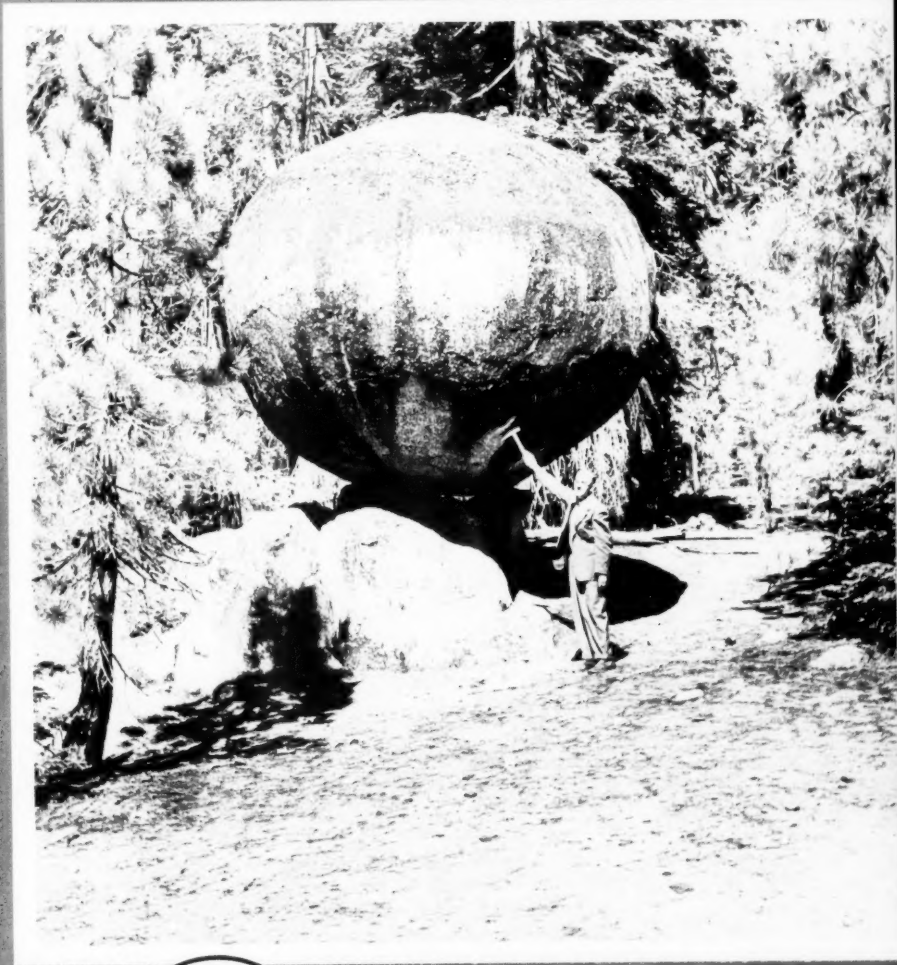


# GEO TIMES

Professional News Magazine



**March 1959**

Volume III, No. 6

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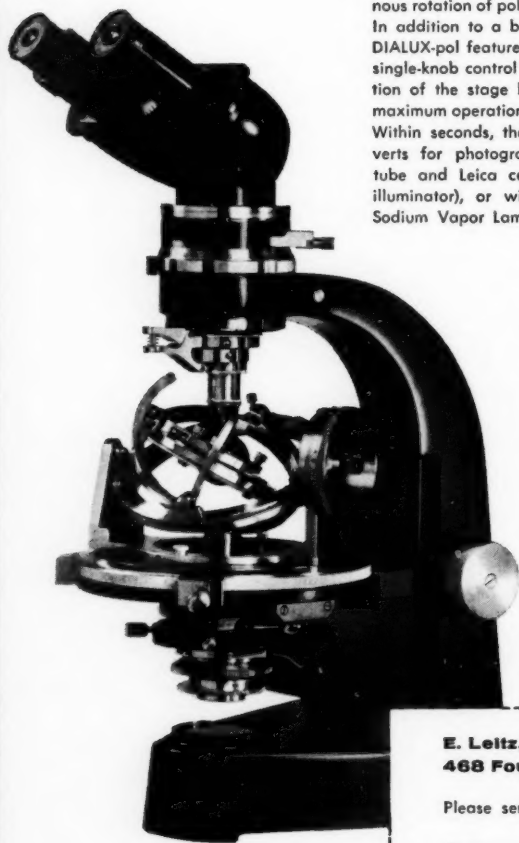
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# Calendar

Cooperation of Society Secretaries in supplying meeting notices for *GEOTIMES* calendar is requested.

Mar. 8-14, 1959—ASP-ACSM: Ann. Mtg., Shoreham Hotel, Washington, D. C.

March 16-19, 1959—AAPG-SEPM: 44th Annual Meeting, Memorial Auditorium, Dallas, Texas.

Mar. 24-27, 1959—AMS: General Mtg., Chicago.

Mar. 27, 1959—Michigan Acad. of Science, Geology Sect., with Michigan Basin Geol. Soc., at Michigan State Univ., East Lansing.

Mar. 27-28, 1959—PENNSYLVANIA ACAD. OF SCI., Spring Mountain House, Schwenksville, Pa.

Mar. 30-Apr. 2, 1959—ASSOC. OF AMER. GEOGRAPHERS, Penn-Sheraton Hotel, Pittsburgh, Pa.

\*April 1-5, 1959—GSA: Cordilleran Sect., Tucson, Arizona; with Arizona Geol. Soc. four one-day field trips into Twin Buttes, Waterman, Santa Catalina & Tucson Mts.; two 2-day trips on SE Arizona & volcanics of Mexico. Guidebooks.

April 2-3, 1959—AIME: SOC. PETR. ENG., Fifth Ann. Joint Mtg. of Rocky Mountain Petroleum Sects., Casper, Wyo.

April 2-4, 1959—OPTICAL SOCIETY OF AMERICA, Spring Mtg., New Yorker Hotel, New York.

April 5-10, 1959—AMER. CHEM. SOC., 135th Ann. Mtg., Boston, Mass.

April 13-14, 1959—LAKE SUPERIOR INSTITUTE ON GEOLOGY, University of Minnesota, Minneapolis, Minn.

April 13-15, 1959—CIMM: Ann. Gen. Mtg., Queen Elizabeth Hotel, Montreal, Quebec.

April 13-15, 1959—ASSOCIATION OF AMERICAN STATE GEOLOGISTS, Lawrence, Kansas.

April 16, 1959—OHIO ACAD. OF SCIENCE, Capital University, Columbus, Ohio.

April 16-18, 1959—GSA: Southeastern Section, Chapel Hill, N. C.

\*April 16-18, 1959—SEPM: Permian Basin Sect., Ann. Mtg. and field trip, Desert Aire Motel, Alamogordo, New Mexico. Write: Richard F. Meyer, Box 1287, Roswell, N. M.

\*April 20-22, 1959—3rd SYMPOSIUM ON ROCK MECHANICS, sponsored by min. engrg. depts. of Colo. School of Mines, Univ. of Minnesota & Penn State Univ. at Golden, Colo.

April 27-28, 1959—SEGp: 12th Ann. Midwestern Meeting, Cortez Hotel, El Paso, Texas.

April 27-30, 1959—INTERNATIONAL SYMPOSIUM on Physical Chemistry of Extractive Metallurgy, Penn-Sheraton Hotel, Pittsburgh.

May 4-7, 1959—AGU: Annual Meeting, Washington, D. C.

May 7-8, 1959—AIME: SOC. PETR. ENG., Permian Basin Sect. Oil Recovery Conf., Midland, Tex.

May 8-10, 1959—AIME: Uranium Local Sect., Moab, Utah, 4th Ann. Uranium Symposium.

\*May 14-16, 1959—GSA, Rocky Mountain Section, Montana State University campus, Missoula, Montana. 3 field trips of Idaho batholith, pre-Cambrian strat. & Glacial Lake areas in vicinity of Missoula. Write: Wehrenberg at Univ. Guidebook.

May 14-23, 1959—INTERNATIONAL PETROLEUM EXPOSITION, Tulsa, Okla. For reservations write: IPE Housing Bureau, Oil Capital Bldg., Tulsa, Okla.

May 30-June 6, 1959—5th WORLD PETROLEUM CONGRESS, Permanent Council, New York. Write: C. E. Davis, Gen. Sec'y. 527 Madison Ave., New York 22.

June 11-12, 1959—IUCr. Commission on Crystallographic Apparatus, two conferences at Karolinska Institutet, Stockholm, Sweden. Inquire: Dr. William Parrish, Philips Laboratories, Irvington-on-Hudson, New York

June 15-17, 1959—SECOND SYMPOSIUM on X-Ray Microscopy & X-Ray Microanalysis, Stockholm. Inquire: Dr. G. Hoglund, Inst. f. Medicinsk Fysik, Karolinska Inst., Stockholm 60, Sweden.

Aug. 24-30, 1959—5th CONGRESS OF THE INTERNATIONAL COMMISSION OF OPTICS, Stockholm, Sweden.

Aug. 30 - Sept. 12, 1959—INTERNATIONAL OCEANOGRAPHIC CONGRESS, A.A.S., UNESCO & ICSU special committee on oceanic research cooperating: United Nations Bldg., N.Y. Write: Dr. Mary Sears, Woods Hole Oceanographic Institution, Woods Hole, Mass.

Oct. 4-7, 1959—AIME: Soc. Petr. Engrs., Fall Mtg., Dallas, Texas.

Oct. 8-10, 1959—AAPG: SW Fed. of Geol. Soc'., 2nd Ann. mtg., Lubbock, Texas.

October 8-10, 1959—OPTICAL SOC. OF AMERICA, Ann. Mtg., Chateau Laurier, Ottawa, Canada.

Oct. 22-23, 1959—AIME: Los Angeles Basin Sect., Fall Mtg., Huntington Sheraton Hotel, Pasadena, Calif.

Oct. 27-29, 1959—AIME: Joint Solid Fuels Conf., Netherlands Plaza Hotel, Cincinnati, Ohio.

Oct. 28-30, 1959—AAPG: Mid-Continent Regional Mtg., Broadview Hotel, Wichita, Kansas.

\*Oct. 31-Nov. 7, 1959—GSA: Ann. Mtg., with Pittsburgh Geol. Soc., Pittsburgh, Pa. Two 3-day trips of Valley and Ridge and Appalachian Plateau; two 1-day trips of SW Penn. and central Penn. Write: Buckwalter, Univ. of Penn., Pittsburgh. Guidebooks.

Nov. 9-12, 1959—SEGp: Ann. Mtg., Biltmore Hotel, Los Angeles, Calif. Jointly with Pacific Section of AAPG on Nov. 12.

Nov. 12-13, 1959—AAPG: PACIFIC SECT., Biltmore Hotel, Los Angeles, Calif. Jointly with SEGp on Nov. 12.

Dec. 12-13, 1959—OKLAHOMA ACAD. OF SCIENCE, Earth Science Sect., Ann. Mtg., Weatherford, Okla.

July 25-Aug. 6, 1960—IUGG: General Assembly, Helsinki, Finland. Inquire: Sec. Gen. G. Lacloere, 30 Avenue Rapp, Paris 7, France.

\*Aug. 6-12, 1960—19th INTERNATIONAL GEOGRAPHIC CONGRESS, General Assembly of the IGU and meetings of the IGU Commission, Stockholm, Sweden. Inquire: The International Geographic Congress Postfact Stockholm 6, Sweden.

\*Aug. 15-25, 1960—XXI INTERNATIONAL GEOLOGICAL CONGRESS, to be held at the Mineralogical Geological Museum of the University of Copenhagen in Denmark. Field trips before and after the meetings.

## SPECIAL FIELD TRIP CALENDAR

See page 18

# *International Geology Review*

Published Monthly

INTERNATIONAL GEOLOGY REVIEW is published monthly by the American Geological Institute with the assistance of an initiating grant from the National Science Foundation.

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# This Month in GEOTIMES



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Robert C. Stephenson,  
EDITOR

Kathryn Lohman  
CIRCULATION MANAGER

Vol. III, No. 6

March, 1959

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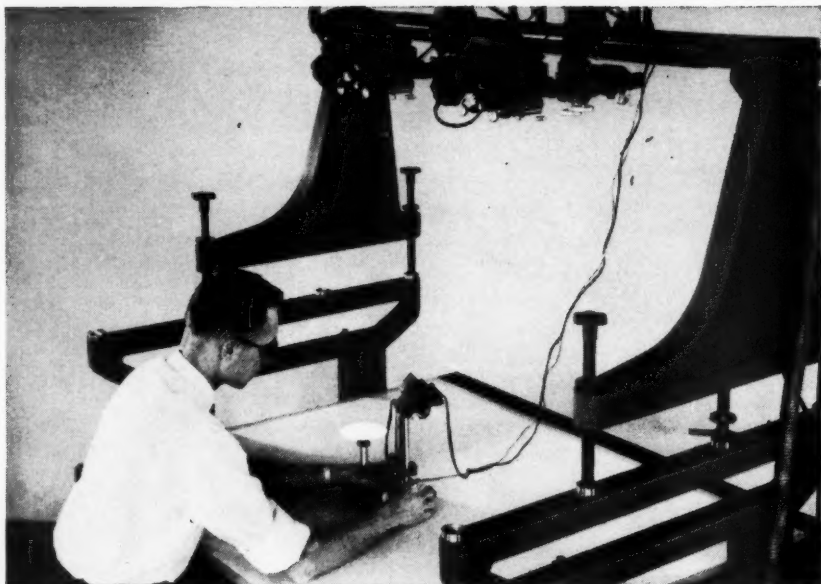
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# Year of Decision

It is well known to most geoscientists that 1959 is the centennial year of the drilling of the Drake Well and the founding of the modern petroleum industry. Most geologists are not appreciative of the fact that 1959 can prove to be a critical and decisive year in the life of the American Geological Institute.

In 1958 the Croneis Committee, appointed by AGI's president, J. V. Howell, requested the fourteen Member Societies to examine the Institute's ten years of operations and to make recommendations for reorientation of the Institute's program and activities. Most societies have responded, but lack of officially endorsed reports from several societies is delaying the analysis by the Croneis Committee.

The recommendations coming out of this evaluation program should be most helpful in improving the effectiveness of the AGI. However, it must be fully realized that some recommendations which appear perfectly reasonable and sound to the outsider, not fully aware of the framework in which the Institute must operate, may have to be modified to adjust to this basic framework.

Sound financing is one of the most critical problems which must be solved. The start made in 1955 has dwindled and there has been scarcely no advance toward the solution of the fundamental problem of an adequate and predictable basic income. A formula is needed by which financial responsibility is adequately prorated among the individuals of the profession. The problem is delicate and the course difficult. Well-meaning but not thoroughly considered action relating to financing could render the Institute ineffectual or even destroy it. However, this we must face—We must match our demands on the Institute with adequate basic funds to permit it to react to these demands.

Time is running out. Disenchantment can and will replace dedication of those who are giving the most to the development of the AGI in the service of the profession unless some tangible changes are made in 1959, a year of decision.



OUR COVER

A perched granitic boulder east of Bass Lake, Madera County, Cal. (supported by Gordon D. Oakeshott) Photo by F. F. Davis, California Div. of Mines.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.

# 100 Years of Oil Geology

Part one of two parts

by PARKE A. DICKEY<sup>1</sup>

There is probably no large industry that is as dependent on geology as the oil industry, or that spends as large a fraction of its budget on scientific studies of the earth. Not only does the oil industry depend on geology, geology depends on the oil industry. More than half the geologists in the world work directly for oil companies, and the support for many geologists in academic and government employment comes from petroleum. On the centenary of the industry of which they have become a part, petroleum geologists would do well to look back over the past hundred years and note their somewhat checkered but still exciting past. Then, with proper humility, they should look forward to the next century. Thanks largely to geology, the world is dependent on oil. Can we continue to find this ideal fuel so that the industry can supply it cheaply to our economy?

## THE FIRST OIL WELL

Oil and gas have been known from time immemorial, and have been regarded with interest by all naturalists concerned with geology. It was not until the 18th century that these substances and coal were all recognized as having been derived from living organisms. In the first half of the nineteenth century oil came to be widely known and used as a fuel and lubricant. Oil and asphalt were familiar substances to American geologists, and a good deal was known about their mode of occurrence when the Drake Well was drilled.

The promoters of the Pennsylvania Rock Oil Company, which drilled the Drake Well, recognized the potential value of petroleum as a fuel and illuminant, if only it could be secured in sufficient quantity. Before they could sell enough stock to get the well drilled, they consulted Benjamin Silliman, Jr., of Yale University, who was one of the principal authorities of his day in chemistry and also in geology. His report was very enthusiastic about the possibilities of the new product, and had the following to say about its occurrence and origin (10): "The usual geological position of the rocks furnishing this natural product (petroleum) is the coal measures, but it is by no means confined to this group

of rocks, and has been found in deposits much more recent, and also in those that are older—but in whatever deposits it may occur, it is uniformly regarded as a product of vegetable decomposition. Whether this decomposition has been effected by fermentation only, or with the aid of an elevated temperature, and distilled by heated vapor, is perhaps hardly settled."

The company hired a former railroad conductor named Drake as superintendent, who started by cleaning out and exploiting the oil springs at Titusville, Pennsylvania. These springs had been famous from before the arrival of the Europeans, and had been exploited by the Indians. Similar oil was produced in salt water wells at Tarentum, near Pittsburgh, 75 miles away, and this gave the promoters the idea of drilling deep wells to obtain the oil in larger quantities. Drake hired a salt well driller, who set up his rig on the site of the old oil springs. They were prepared to go to several hundred feet, but struck an oil sand at only 69½ feet on August 27, 1859. The well pumped about 500 gallons of oil per day, which could be readily sold for \$1 per gallon to refineries making kerosene from coal and asphalt. This tremendous income set off an excitement which exceeded the California gold rush of 10 years previous (11).

The principal sands of the area lie at a depth of 400 feet (Fig. 1). These were

<sup>1</sup>Creole Petroleum Corp., Maracaibo, Venezuela.



soon tapped, and wells making hundreds of barrels of oil daily were drilled before the end of 1860. The excitement increased still more in 1861 when flowing wells producing thousands of barrels a day were drilled. This enormous production utterly exceeded the capacity of the refineries, and the price fell drastically. The demand continued to increase, however, and the industry has had a rapid growth, punctuated to this day by similar periods when the supply exceeded the demand.

In reminiscing about the discussions that led to the choice of a well location, Drake said (12): "Within ten minutes after my arrival on the ground I had made up my mind that it (oil) could be obtained by boring as for salt water . . . But I found that no one with whom I conversed on the subject agreed with me, all maintaining that the oil was the drippings of an extensive coal field or bed, and if so there would be no use in boring, as the oil would be near the surface. But I could not understand why it was under the creek if it came from the hills, as it is so much lighter than water that it would be impossible for it to go down of its own accord."

It is interesting to note that erroneous geological theories had an adverse effect on prospecting for the first oil well, as they have had many times since.

The first Geological Survey of Pennsylvania by H. D. Rogers had recently been completed, so the educated oil men had a fair idea of the stratigraphy of the Oil Regions. By the early 1860's the occurrence of oil in the pores of a "sandrock" and its frequent association with salt water were well known.

At first wells were drilled only in the creek valleys. Like present-day prospectors, the operators looked for oil in places which resembled those in which it had been found. It was not until 1864 that a venturesome operator, probably against the advice of the experts, drilled a well on a hilltop near Oil City, Pa.

#### EARLY PETROLEUM GEOLOGY

As drilling proceeded it became apparent that the oil fields lined up in long, narrow belts and trends. This must have been noted by many operators, but the most astute and literate was C. D. Angell (7), who owned a lease at Scrubgrass in the Allegheny River valley, which is here very narrow. He noticed a similar small spot of production up the river at Foster. He was not trained as a geologist, but was well educated and former school board member. Studying the well records, he found that

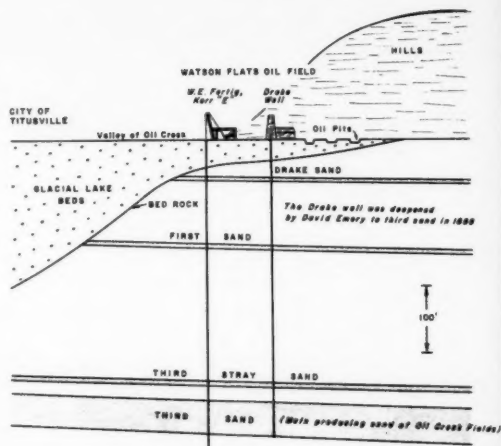


FIGURE 1. A schematic representation of the geology of the Drake well, Titusville, Pennsylvania, completed to a depth of 69 feet on August 27, 1859, and later deepened to the Third Sand.



FIGURE 2. C. D. Angell was the first oilman to recognize the linearity of oil trends. He made this observation in Pennsylvania, between the Scrubgrass and Foster pools.

the sand thicknesses and intervals were similar at Scrubgrass and Foster, so he decided that they were both on the same belt. Having faith in his idea, he had engineers run a line connecting these pools through the plateau east of the river, and leased the land on either side of this line. His idea proved correct, and he was wonderfully successful, becoming very wealthy. The linearity of oil trends is very well marked in this area. (Fig. 2)

The Second Geological Survey of Pennsylvania was organized in 1874 under the direction of J. P. Lesley, a man of unusual brilliance, ability and charm, and a fine

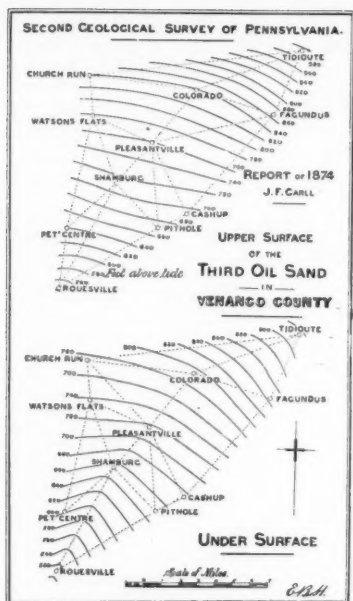


FIGURE 3. John F. Carll of the Pennsylvania Second Geological Survey is credited with this, the first published structure map of an oil field.

geologist. He assembled an able group of assistants and gave them much freedom to do their own work and publish their own reports promptly. Lesley himself had shown the importance to geology of contoured topographic maps and had introduced contours to represent geologic structure.

The geologist assigned to the oil regions was John Franklin Carll. He at once proceeded to examine samples and run levels between wells. At the end of the first year's work he published a progress report. In this is a structure map of the area in which the principal oil fields occur. (Fig. 3) (13). The fields themselves are not shown on this map, but they are shown on a larger map to the same scale folded in the same report. The linear character of the oil pools was by now well established and Carll refers to them quite naturally as "belts" and "leads". Carll introduced most of the standard techniques of the oil geologist, including the saving and describing of samples, the plotting of trip logs, the correlation of sands, and the construction of structure maps (14).

In the meantime oil had been discovered in western Ontario at localities that were recognized by T. Sterry Hunt, a geologist of the Canadian Survey, as anticlinal (15).

E. B. Andrews, of Marietta, Ohio, followed the prominent and very sharp Burning Springs Anticline in western West Virginia, and noted the occurrence of oil seeps and some producing oil wells along it (16). The relation between oil occurrence and structure was not accepted by the profession. The Ontario fields have had some economic importance, but those along the Burning Springs Anticline have never been of much account. In 1874 most of the oil in the world was coming from an area where there are no anticlines, but only a gentle regional dip to the southwest. Lesley, in a note appended to a cross-section of the Warren area, in the 1874 report on the Oil Regions wrote (13):

"This section will serve another useful purpose. It must impress the reader with a conviction of the *undisturbed condition* of all this part of Pennsylvania. The popular notion that petroleum wells are dependent upon anticlinals, faults, or other disturbances, is a pure fancy of the imagination. And it is very desirable to get rid of it. Even geologists of standing and reputation are still more or less affected by it . . . The district of greatest oil production in Pennsylvania is precisely the district where there never has been any disturbances whatever."

The structural theory was revived and applied to gas by I. C. White, in 1882 (17) and later by White and others to oil in West Virginia. There are big closed structures in West Virginia which affect both oil and gas accumulations. Even here, however, most oil pools are strongly affected by lensing of sands, so the theory was not very useful in prospecting for oil although it was notably successful during the big expansion of the natural gas industry which occurred at Pittsburgh starting about 1882. The Lima-Indiana fields, which were the next great set of oil fields after Pennsylvania, were not on well-defined anticlines, although Orton (18) pointed out five years after their discovery that the gas, oil, and water lay at definite structural elevations. The anticlinal theory remained unused by oil men, not because they were conservative, but because it did not apply to the principal oil fields of the time, and obviously could not be used to find oil in these areas.

Malcom J. Munn's report on the Sewickley Quadrangle, Pennsylvania, is one of the best of the early U.S. Geological Survey reports (19). He pointed out that in general, most of the important oil fields were on anticlines. However, the simple applica-

tion of the anticlinal theory did not explain them. He described the stratigraphic factors in accumulation which had been neglected by White, and pointed out that "it is obvious that any fluid will move more rapidly through a coarse conglomerate imperfectly cemented than through a dense, fine grained sandstone, the particles of which are thoroughly coated and all the interstices filled with impervious cement. If the oil-bearing rock contains areas practically impervious, these areas, according to their size and position, will be more or less perfect barriers against the movement of oil or gas."

Munn was the first geologist to recognize capillary forces in oil reservoirs. He pointed out that the buoyancy of an oil droplet is insufficient to make it rise against the capillary forces in the rock. He ascribed oil accumulation to the motion of water through the rocks combined with capillary screening forces; an explanation that is widely held today by students of the subject. Munn attained much recognition and went to Oklahoma, where he organized in 1913 a geological department for the Gypsy Oil Co., producing subsidiary of Gulf. Although geological advice had been sought by oil men since the time of the Drake Well, the geologists were employed as consultants or advisers, and this was the first organization of a geological department by a major company in the U.S.

#### TRIUMPH OF THE ANTICLINAL THEORY

After Ohio, the next large oil fields were found in eastern Kansas. The wildcatters drilled mostly on seeps and tar-stained sands, or on "hunches". They worked their way southward into Oklahoma in the early 1900's, discovering many rich shallow pools, all stratigraphic, by random drilling.

The first geologist to engage in commercial oil work in Oklahoma was H. B. Goodrich who went to Ardmore in 1903 for the Santa Fé Railroad. He located an oil field near some asphalt seepages. The U. S. Geological Survey did some work starting with J. A. Taff about 1895, and the State Geological Survey was founded in 1908 with Charles H. Gould its first Director (20).

The fact that anticlines are favorable places to find oil finally became spectacularly evident with the discovery of the Cushing field in March 1912 (Fig. 4). Cushing is a prominent north-south structure with three separate domes. It can be seen on the surface and was mapped by W. S. Vandruff and his son in March 1911 for the Hill Oil and Gas Company (21). The discovery well was drilled by Shaffer

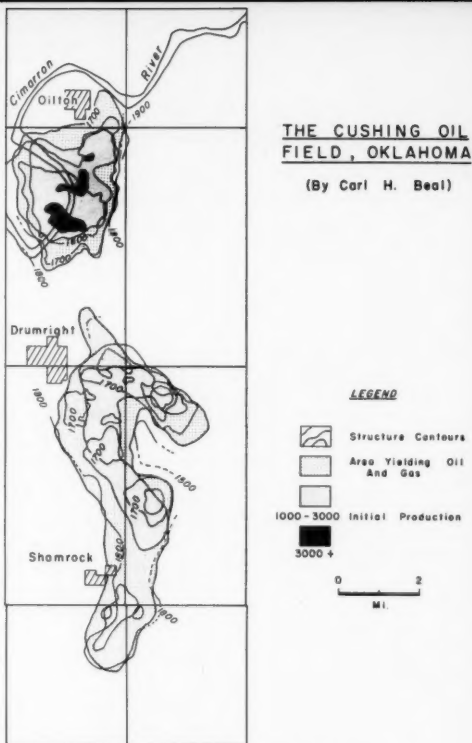


FIGURE 4. The anticlinal accumulation of oil was recognized clearly in the Cushing field which was discovered in March 1912.

and Smathers in March 1912, without the aid of geology. Development was rapid during 1913 and 1914, but the pool was so big that the peak rate was not reached until May 1915, when it produced 305,000 barrels per day. In May 1914, the Oklahoma Geological Survey published a structure contour map of the surface geology of the Cushing field by Frank Buttram (22) and others. It showed that the subsurface contours and the line separating the oil from the water paralleled the surface structure contours, and it made a big impression on many producing companies.

The discovery of the largest field yet found in the U.S. and probably in the world, on a well-known structure easily mappable from the surface, established geology in the oil business, and furnished the idea on which most new discoveries were based for the next 15 years. Among the companies who reaped the greatest oil-finding success from geology were Guffey and Gillespie and the Gypsy Oil Company (both later taken over by Gulf), Marland Oil Company (now Continental), Empire Gas and Fuel (now Cities Service). Even though many discoveries were still made by

(Continued on page 24)

# Earth Science Training Inadequate

**Most school science teachers are poorly equipped to teach earth sciences**

by F. MARTIN BROWN<sup>1</sup>

GEO TIMES has carried a number of articles and letters about the need for teaching more about the Earth Sciences. An examination of the curricula used in many of the school systems in the country reveals that the only teaching of this field of science that is widespread is in the courses of General Science. Very few high school courses are given in Earth Sciences. Here and there an enthusiastic teacher finds a way to include a course in Physiography or Geology. These are exceptions. So to see why the interest among students is low in the Earth Science area it is necessary to turn attention to those who teach General Science at the 7th, 8th and 9th grade levels. I have had recently the opportunity to examine critically the credentials of 203 teachers of General Science. In these I believe I have found why there is so low interest in our field of study.

First let me define the group of teachers in which I was interested. They were candidates for appointment to the General Science Seminar to be held in the summer of 1958 at Colorado College in Colorado Springs under the joint auspices of the college and the National Science Foundation. They all are teachers who want to improve their knowledge of science and of science teaching. They are interested enough in their work to forego attending courses in Education for one that is not so labelled. This means that they do not have their eyes glued to courses that, in the majority of school systems, will be used to measure the salary they are to receive. I think that we can consider that these men and women come from among the really dedicated teachers.

Now to the purpose of this note. Let me take you through this mass of material in my desk in a Socratic manner. Let us ask pertinent questions of the data and find the answers.

Where do these men and women teach? Is the sample restricted to one geographic area? It is somewhat restricted. Although all but seven of the forty-eight states are

represented, 135 are teaching in the great Middle West from the Great Lakes south to the Gulf of Mexico. The rest are concentrated in the Rocky Mountain and West Coast area, 58, with but a thin scattering, only 10, from the Atlantic seaboard. Teacher-wise, this sample comes from the region most completely dominated by teachers' colleges.

Where did these teachers go to college for their undergraduate work? The answer to this is everywhere but the greatest number attended state teachers colleges and what we used to call normal schools. A much smaller number graduated from the large state universities, usually from the school of education. A very few attended the well-known liberal arts colleges. Almost universally any graduate work that these people have done has been in the professional field of Education.

How well prepared are these teachers to recognize and stimulate the embryo scientists, and in particular, the embryo earth scientists that sit before them in class? Remember, these are the people who teach our children when they are most eager to learn and least inhibited in choice of interest. These are the teachers who can recognize and direct an interest in science if they themselves are truly interested in science.

As a measure of preparedness I have used the number of semester hours these teachers have devoted in their undergraduate and graduate work to the study of Biology, Chemistry, Physics, Earth Sciences, Mathematics and, of course, Education. This is not a good measure for it does not recognize the quality of the teaching they received nor does it recognize the specific areas they studied within a science. It is the best measure I have and has the advantage of being numerical. To make things simpler, always a bad thing, I have arbitrarily established categories, Unsatisfactory preparation, Satisfactory preparation and Excellent preparation. To do otherwise would necessitate long tables of data, interesting to a few and passed over by the multitude. I have considered that less than 10 semester hours of a particular

<sup>1</sup>F. MARTIN BROWN, Head of Science Department, Fountain Valley School, Colorado Springs, Colorado.

science is unsatisfactory, 10 to 29 hours satisfactory, and 30 or over excellent preparation to teach at the levels involved. Here is the tally of backgrounds among the 203 teachers studied, reduced to percents in each of the three categories:

Area	Unsatisfactory	Satisfactory	Excellent
Biology	22.7	54.2	23.1
Chemistry	47.8	46.8	3.9
Physics	66.5	33.0	0.5
Earth Sciences	88.7	10.3	1.0
Mathematics	86.7	5.4	7.9
Education	0.5	64.0	35.5

When you consider that fully two-thirds of the material that is included in the average General Science textbook for the 7th through 9th grade levels is drawn from the physical sciences it is at once obvious that the majority of the teachers in this group, a select group at that, lack the background to teach General Science. What must be the situation in the country at large? No wonder those of us who have some understanding of the world situation and of the teaching situation say that it will be at least ten years before this country can start to regain its position as a producer of scientists.

Now for a moment let me turn to those who claimed courses in the Earth Sciences. The great majority of the courses claimed are in geography, usually one or two introductory courses. A limited number said that they had had an introductory course in geology. One wanted to claim that welding was an Earth Science! Disallowing welding and the ilk but including geography as a legitimate Earth Science, a table of semester hours claimed is this:

Semester Hours	Percent of Candidates	Running Total
None	46.2	
1-2	5.4	51.6
3-5	22.2	73.8
6-8	12.3	86.1
9-11	4.9	91.0
12-20	5.4	96.4
21-29	2.5	98.9
30 and over	1.0	99.9

To me this tells the story all too clearly. The reason that there is so little interest in the Earth Sciences is that the teachers who introduce our children to the whole field of science are so poorly informed about our science.

What can we do about it? Not much for the benefit of the children going through our schools now or in the next five to ten years. First we must see to it that the training schools for teachers, especially those that prepare elementary school and junior high school teachers, the state colleges of education, recognize the need for ground work in the earth sciences on the part of every school teacher. After they recognize this we must do all in our power

## NEW OFFICERS for AAPG AND SEPM

The Society of Economic Paleontologists and Mineralogists has announced that PROFESSOR SAMUEL P. ELLISON, JR., of the University of Texas, has been elected president of the society to succeed GORDON RITTENHOUSE. WILLIAM J. PLUMLEY is elected vice-president; JOHN IMBRIE, secretary-treasurer; M. L. THOMPSON and C. W. COLLINSON as co-editors of the *Journal of Paleontology*; and JACK L. HOUGH as editor of the *Journal of Sedimentary Petrology*.

The American Association of Petroleum Geologists announces that DR. LEWIS G. WEEKS, consulting geologist of Westport, Connecticut, will become the 43rd president of the Association, succeeding GEORGE S. BUCHANAN. ALFRED H. BELL is to become vice-president; HAROLD T. MORLEY continues as secretary-treasurer and GROVER E. MURRAY becomes Editor of the *Bulletin*.

## Porous Media Conference

U. of Oklahoma  
March 23-24

The School of Petroleum Engineering of the University of Oklahoma is holding its second conference on the THEORY OF FLUID FLOW THROUGH POROUS MEDIA on the campus, March 23-24. The conference will discuss theoretical aspects of single and multiphase fluid flow in porous solids. For further information write Professor Charles G. Dodd, School of Petroleum Engineering, University of Oklahoma, Norman, Oklahoma.

to see that the subjects as taught are of value. Secondly we must encourage teachers who are now in our schools to take advantage of the opportunities to increase their knowledge of the earth sciences. Such programs as the Rocky Mountain Association of Geologists uses with the teachers in the Denver school system should be multiplied a hundredfold. We might go so far as to establish on several campuses now vacant in the summer "schools" under the direction of local earth scientists for those who can attend. These could be evening or week-end schools. Thirdly we can encourage the institutions cooperating with the National Science Foundation to include Earth Science seminars tailored to the needs of the teachers of General Science. This is being done now at Colorado College in the guise of General Science.

## SECOND CARIBBEAN GEOLOGICAL CONFERENCE

A report by John D. Weaver

The Second Caribbean Geological Conference, held by Mayaguez, Puerto Rico, from the 4th to the 9th of January, 1959, at the invitation of the University of Puerto Rico and the Economic Development Administration of the Commonwealth of Puerto Rico was, like the G.S.A. meetings at St. Louis, officially recognized by the gods of the nether regions who obliged us with a strongly perceptible tremor at about 11:40 a.m. on Wednesday, January 7th. Ted Arnow, USGS Water Supply Branch, was in the middle of an interesting paper on the water supply problems of Puerto Rico and was the only person on his feet. He did not feel the shock and was a little taken aback when his audience after a short "shocked" hush burst into delighted laughter. He thought for a moment that he must have said something he shouldn't. (Ed.—like "hurrah for water witchers.") This mark of approval was the final touch to what proved to be an extremely enjoyable as well as valuable and stimulating conference.

Geologists from most of the Caribbean countries, as well as from Great Britain, Germany, and the continental United States, attended the conference and all were accommodated at the Rosario Hotel in its beautiful setting close to the city of Mayaguez. Apart from an opening session at the College of Agriculture and Mechanic Arts of the University of Puerto Rico, when the Chancellor, Don Jaime Benitez, made the Opening Address and Dr. Carlos Vincenty, Director of the Industrial Laboratories of Fomento, also made a welcoming speech, the technical sessions were all held at the hotel.

All the papers presented were of a high caliber and many gave rise to lively discussion. Such problems as the Miocene-Oligocene boundary—involving the very existence of the Oligocene in the Caribbean, the use of the term "geosyncline," the significance and origin of erosion surfaces, the origin of the dioritic rocks, very soon came up for discussion and recurred from time to time throughout the conference. The origin of bauxites and the process of laterization also gave rise to much interesting discussion. In all, thirty-three papers were presented covering many aspects of Caribbean geology.

In addition, the bus trips from and to San Juan were conducted as geological ex-

cursions and on the Wednesday afternoon a field trip, under the direction of Dr. Peter Mattson (formerly of Princeton, now USGS) was made across the southwestern part of the island. This ended at the beautiful fishing village of La Parguera where a buffet supper was provided at the invitation of the Institute of Marine Biology and the Geology section of the University. Many of the delegates took the opportunity to visit the unique Phosphorescent Bay. Here again nature assisted by providing a dark moonless night.

Conferences of this type are particularly valuable in regions such as the Caribbean where geologists are apt to be working in conditions of isolation, far from their professional colleagues. It is good to be able to report, therefore, that this series of Caribbean Geological Conferences seem now to be established. The first conference was held in Antigua in December 1955 on the initiative of Mr. G. M. Stockley, then of the Geological Survey of British Guiana, and of Mr. Martin-Kaye, who was then Government Geologist to the Leeward Islands and now holds the similar post in the Windward Islands. Professor Zans, of the Geological Survey Department of Jamaica, invited the conference to hold its third meeting in Jamaica in December 1961 or January 1962.

In addition to this, a proposal was approved and is being implemented to start a system of six monthly exchanges of information as to work in progress in the Caribbean area with details of types of rocks under study, problems encountered, etc. This should be most valuable.

This second conference was organized by a committee consisting of Professor J. D. Weaver, College of A & M Mayaguez (UPR), Chairman, Professor Rosa Novarro de Haydon, College of Education, Rio Piedras (UPR) and Mr. Mort Turner, formerly chief geologist of the Economic Development Administration, now in practice as a consulting geologist. The Transactions of the conference will be published in part with assistance of a grant from the National Science Foundation.

Copies of the program, with abstracts, and of the field trip road logs are still available on application to Professor J. D. Weaver, College Station Mayaguez, P. R.

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**The Future of  
GeoTimes Depends  
On Contributions . . .**



## Geology Teachers Conference At Oregon State

The Geology Department, Oregon State College, has been selected by the National Science Foundation to offer a Summer Conference for College Teachers of Undergraduate Geology, June 15 to 27.

The Conference as proposed will bring together on the Oregon State College campus approximately thirty college teachers of geology from various parts of the country. Purpose of the Conference is to provide experienced teachers with an understanding of basic concepts, principles, and their interrelationship within the framework of the selected topic.

Subject matter dealing with the Stratigraphy, Structural Geology, and History of the Mesozoic of the Pacific Coast and Pacific Northwest will be presented. The staff selected to lecture and lead discussion is as follows:

TRIASSIC—Dr. Siemon Muller, Stanford University

JURASSIC—Dr. Ralph Inlay, United States Geological Survey

CRETACEOUS—Dr. David Jones, United States Geological Survey

STRUCTURAL DEVELOPMENT—Dean A. J. Eardley, University of Utah

CORRELATION PROBLEMS—Dr. H. E. Wheeler, University of Washington

The first seven days of the Conference will be devoted to the lecture discussion phase. The remaining five days will be spent in an extended field trip through central Oregon, including a one-day trip across the Coast Range and along the Oregon Coast. The field trips will be designed so that the participants will have an opportunity to see an extensive section of Cenozoic as well as Mesozoic rocks in Oregon. All will travel in one chartered bus.

Each participant selected will receive a stipend of \$180 and travel allowance computed at the rate of four cents per mile for one round trip from his home. The average travel allowance for the group cannot exceed seventy dollars each. There will be no dependency allowances.

For application forms and other details write W. D. WILKINSON, *Summer Teachers' Conference, Department of Geology, Oregon State College, Corvallis, Oregon.*

## AGI GLOSSARY REVISION STARTED

Plans are underway to prepare a supplement to the AGI Glossary which will carry new terms developed since the glossary project was completed in 1956 and correct some of the more obvious errors in the original glossary.

Persons are requested to direct their suggestions to J. Marvin Weller, Chairman of AGI Glossary Review Committee. All new terms should be defined in full and the exact reference to the paper in which the term appears should be cited. Discussion of definitions thought to be incorrectly given in the present AGI Glossary should be similarly documented as specifically as possible.

The Glossary supplement produced by the Glossary Review Committee will be bound in the back of the third printing of the AGI Glossary and will also be sold as separates.

Over 10,000 copies of the AGI Glossary of Geology and Related Sciences have been sold since the volume was first announced in the spring of 1957. No single publication has had more impact on geologic terminology. The future improvement of the Glossary will depend largely on the assistance of the profession in its revision.

*Send your glossary suggestions to*

**Dr. J. Marvin Weller  
Department of Geology  
University of Chicago  
Chicago 37, Illinois**

## Gault Named New Head at Lehigh

Dr. H. R. Gault has recently been appointed head of the Department of Geology, Lehigh University, effective July 1, to succeed Dr. Bradford Willard who is retiring. Professor Gault has been at Lehigh since 1946. He served as Executive Secretary of the Division of Earth Sciences of the National Research Council while on leave during the 1953-54 academic year.

Dr. Gault represents the Geological Society of America on the AGI Government Relations Committee.

# ...YOUR CONTRIBUTIONS!!



## DULUTH CONFERENCE

July 20-August 28, 1959

*University of Minnesota*

**Duluth Branch, joins AGI in a summer conference to improve geology teaching resources.**

The Duluth Conference for the development of teaching resources in the geological sciences will bring together approximately 30 science teachers and professional geologists-geophysicists for a concentrated six-week workshop conference on the campus of the University of Minnesota, Duluth Branch, July 20-August 28, 1959.

The Duluth Conference is an integral part of a Teaching Resources Development Program in the geological sciences conceived by the AGI Education Committee to meet a lack of organized, evaluated resource materials which can be used in the teaching of geology in the elementary school science courses. The Conference is co-sponsored by the University of Minnesota, Duluth Branch, and the American Geological Institute with the aid of enabling grants from the National Science Foundation.

The plans for the Duluth Conference have been developed by a Steering Committee operating under the purview of the AGI Education Committee. The project director is Professor Robert L. Heller, Chairman, Department of Geology, University of Minnesota, Duluth Branch.

### DULUTH CONFERENCE STEERING COMMITTEE

ROBERT L. HELLER, *Chairman*  
C. E. DUTTON, U.S.G.S., Madison, Wisc.  
P. E. FITZGERALD, Dowell Inc., Tulsa  
R. W. MARSDEN, Oliver Mining Div., U.S. Steel Co., Duluth  
G. A. THIEL, Univ. of Minnesota, Minneapolis  
G. M. WILSON, Illinois Geological Survey  
C. J. ROY, *ex officio*, Chairman, AGI Education Committee  
R. C. STEPHENSON, *ex officio*, Executive Director, AGI

Despite the natural enthusiasm and interest shown by boys and girls for geology, teaching of the geological sciences is generally poor or lacking in most elementary and secondary schools throughout the country. There is a general lack of formal training in geology among science teachers.

The Education Committee of the Amer-

ican Geological Institute, after careful consideration, has concluded that the fundamental point of attack on the problem should be in the area of teaching resources. It is reasoned that with better teaching resources relating to the geological sciences, today's science teachers can be stimulated to incorporate more geology in their science teaching. Furthermore, with improved teaching resources at hand, there will be greater incentive for colleges and universities to include geology in the training of future science teachers.

It is the expressed desire of the AGI Education Committee to press for strengthening of teaching resources in the geological sciences as an integral part of elementary and junior high school science programs. The program would also seek to point up geologic materials which might be used to implement teaching of high school chemistry and physics. It is not the intent of the program to promote the introduction of a full course in geology in the already too-full high school curriculum. In touching on this point, however, it is significant to note that an earth science course for advanced science-minded ninth graders has proven most successful in New York State.

The first phase of the Teaching Resources Development Program will be to assemble and inventory various existing resource materials prior to the Duluth Conference. The Conference is expected to direct attention and energy to three broad topics:

- A. Consideration of course content concepts
- B. Assembling, cataloging and evaluation of reference and classroom materials
- C. Planning, preparation and testing of field and laboratory projects

It is visualized that the Teaching Resources Development Program will continue for at least one year after the Duluth Conference. Materials produced by the

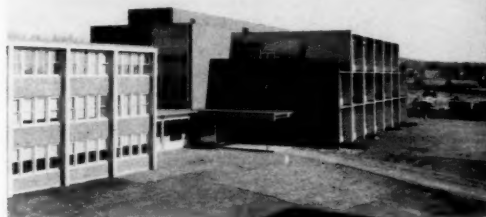


ABOVE: Lake freighter enters the busy Duluth-Superior Harbor.



UPPER RIGHT: Dorms on the UMD campus will house the single participants in the Duluth Conference.

RIGHT CENTER: The Geology Department is housed in the Science Addition (left) where the conference will be held. On the right is Kirby Student Center with cafeteria and lounge facilities.



LOWER RIGHT: The Kirby Student Center Lounge, just a few steps away from the Science Addition on the University of Minnesota, Duluth Branch Campus.

OPPOSITE PAGE: Dr. Robert L. Heller (left), Project Director for the Duluth Conference, discusses the Conference operations flow sheet with Dr. Ralph W. Marsden, a member of the Conference Steering Committee. Heller is chairman of the geology department at the University of Minnesota, Duluth Branch, and Marsden is with the Oliver Mining Div., U. S. Steel Co., Duluth.



Conference will be collated, edited and tested in selected areas of the country. The results of the testing will require review, and revisions will be necessary before the materials are made available on a wide scale.

Approximately 30 persons are being selected by the Steering Committee for participation in the Conference. The candidates are selected on the basis of interest, experience, knowledge, potential productivity, and creative ability. The conferees fall into four groups: A. school teachers, B. state geological survey personnel, C. other professional geologists-geophysicists, and D. scientists from other earth science disciplines such as meteorology, astronomy, etc.

The Conference headquarters will be the

new Science Addition on the UMD campus. Single men and women participants will be housed in campus dormitories. Meals will be available in Kirby Student Center adjacent to the science building. All arrangements for the physical aspects of the conference will the responsibility of the University.

Weekend field trips to the Mesabi Range and the classic geologic area along the north shore are being planned by the Lake Superior Geology Club with the assistance of the local mining companies.

The Duluth Conference should be an interesting and most worthwhile experience for all participants. The resource development program should be a significant step toward better teaching of geological science.



## MANPOWER in a column -

By HOWARD A. MEYERHOFF

Scientific Manpower Commission  
1507 M Street, N.W., Washington 5, D. C.

A communication of recent date asserts that mass unemployment for members of the geological profession is here to stay. For our part we don't indulge in such long-range predictions, but for the short haul the situation isn't rosy.

Another sheaf of communications points the need to modernize geological training, to expand its base, and to stiffen the requirements for the bachelor's degree. The implications of these proposals will bear analysis.

The first implies that the profession has not kept pace with the advances in physics, mathematics, and chemistry that have application in geology. Inevitably, there is a lag in the transfer of new knowledge from the field in which it is developed to another in which it can be effectively employed. But the lag in geology seems to be measurable in geologic time.

The belated application of hydromechanics and statistics in geomorphology is a case in point. The neglect of research in earth magnetism and gravitation has been stressed in the NSF report on minerals research.

The second implies that the profession has been slow to grasp its potential in fields where it has contributions to make. Oceanology, defined as the geologic branch of oceanography, and several phases of engineering have been cited as examples.

The third implies that requirements for a bachelor's degree with a major in geology are so heterogeneous that it is possible to judge the product only through the reputation of the school and the caliber of the department. Talk has drifted to accreditation of departments, and more is likely to be heard on this subject in the immediate future.

One bright spot in this drab picture was summer institutes in geology for college teachers, directed by D. M. Henderson and A. F. Hagner at the University of Illinois during the past two summers. Last year 26 teachers spent eight weeks studying minerals and mineral aggregates with spectrographic, X-ray diffraction, and electron microscope equipment. This has been a project in which the teacher learned the use of modern equipment in demonstrating modern concepts, and to which physicists

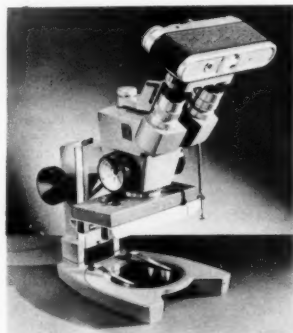
## NSF Aids Science Teachers Seeking Research Experience

The National Science Foundation recently announced the award of grants totaling \$800,000 to 54 colleges and universities for support of programs to provide summer research experience for teachers of science from high schools, junior colleges, and small colleges. Under provisions of the programs, the teachers will have an opportunity to participate in existing laboratory and field research programs, and this is expected to fill a gap in the teachers' experience.

Geology departments are expecting to participate in the programs on 4 of the 54 campuses, but none of the requests originated with geology departments. Where geology is participating the teachers will be working for the most part on field research projects.

Inquiries concerning the future of this program should be addressed to *Research Participation Programs for Teacher Training, National Science Foundation, Washington 25, D. C.*

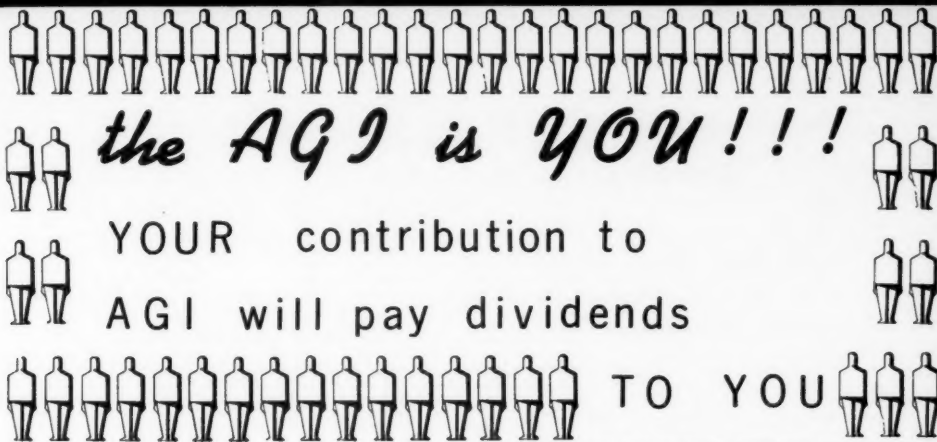
*You saw it in GeoTimes . . .*



STEREOPHOTOMICROGRAPHY is available through the addition of a stereocamera attachment to a binocular microscope. The camera may be swung in and out of position. The camera shoots the same sharp, three-dimensional image as seen by the eye. For further information write A O Instrument Division, Buffalo 15, N. Y.

and chemists contributed the latest applicable discoveries in their respective fields. Florida State has announced a summer "institute" in marine geology for 1959. (*GeoTimes*, Vol. III, No. 5)

Maybe we are making progress after all.



*the AGI is YOU!!!*

YOUR contribution to  
AGI will pay dividends

TO YOU

### 1959 Committee of 1000 For AGI Grows

Below are listed new additions to the Committee of 1000 for AGI-1959. These persons have qualified for the Committee of 1000 by contributing \$10 or more to the support of the Institute. The names of 24 previous contributors were published in the January-February issue of *GeoTimes*.

Until the profession provides a more stable and equitable means of financing Institute operations, the various fund raising mechanisms of AGI are vital to its continuation. The Committee of One Hundred, the Committee of 1000, and those contributing smaller amounts, each have their special niche in the support of the Institute program. Without these sources of income AGI activities will be sharply curtailed.

Persons added to the Committee of 1000 for AGI-1959 since the last issue of *GeoTimes* are:

James L. Albright	W. C. Irving
C. H. Atchison	Charles C. Jefferson, Jr.
Clayton G. Ball	Philip M. Konkel
Douglas Ball	Frederick C. Kruger
Charles W. Barnes	John F. Mann, Jr.
John G. Barry	Brian Mason
Robert L. Bates	William M. Merrill
Robert B. Baum	Coe Mills
Arthur Bevan	Charles B. Moke
Jules Braunstein	William C. Rasmussen
Gilbert H. Cady	Robert G. Reeves
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John B. Currie	Chalmer J. Roy
T. W. Daniel, Jr.	Robert R. Shrock
D. A. Davis	Cramon Stanton
Avery A. Drake, Jr.	Leo A. Thomas
Noel Evans	C. Richard Wagner
W. M. Furnish	Ralph H. Wilpolt
George F. Hanson	James C. Wright
Herbert Hendriks	

### KEEP GEOTIMES COMING

Perhaps you are one of the geologists or geophysicists who feels that you can get along without *GeoTimes*. Perhaps you also feel that there is little or no need for the American Geological Institute and the services it performs.

**If you are one of these—read no further—for you won't be interested in what we have to say.**

On the other hand, you may be one of the many who have offered comments like these, "*I like *GeoTimes*—keep it coming*" or "*The services performed by AGI continue to grow and to become more important to the profession—keep up the good work.*"

**If you are one of these, we invite you to consider our problem.**

AGI continues to be dependent upon contributions of members of the profession to keep *GeoTimes* going. Contributions of our Member Societies provide only for the most basic AGI expenses; none of these funds go to *GeoTimes*.

If you carry your weight through an annual contribution to support *GeoTimes*, AGI will do its best to keep *GeoTimes* coming to you. You aid us, and we'll aid you.

**If contributions are inadequate, *GeoTimes* will stop . . . AND WE ARE NOT KIDDING.**

*Acts in  
Geology's  
Interest*

## Some things you should know

### ... about AGI and GeoTimes

- No funds from AGI Member Societies' contributions can be diverted to support *GeoTimes*.
- Contributions of AGI Member Societies provide only for the minimum basic expenses of maintaining an Institute.

- Advertising provides more than half of the needed income for operating *GeoTimes*.
- Your individual contributions as *GeoTimes* readers must provide the balance of this income.
- Your contribution is vital to the very existence of *GeoTimes*.

## ATTENTION ALL FIELD TRIP PLANNERS

The Field Trip Calendar appearing now as a regular feature of *GeoTimes* is prepared with the assistance of the AAPG Field Trip Research and Coordinating Committee, George H. Fentress, Chairman.

Your field trip will not appear on this calendar by telepathy. If you want your field trip to receive public notice—see that the notice is submitted. To avoid conflicting dates, submit your schedule early to George H. Fentress, Chairman AAPG Field Trip Research and Coordination Committee, P. O. Box 2585, Denver 1, Colorado.

### 1959 SCHEDULE OF FIELD TRIPS

For additional field trips held in conjunction with meetings, see those items marked with an asterisk under meeting calendar.

- April 11—ILLINOIS STATE GEOL. SURV., trip to Metropolis area of Massac & Pope Counties, Illinois.
- April 12—LAKE SUPERIOR INSTITUTE ON GEOLOGY Field Trip to igneous and metamorphic rocks of Minnesota Valley. Write: J. C. Craddock, Dept. of Geol. & Mineral., Univ. of Minnesota. Guidebook.
- April 18—OHIO ACADEMY OF SCIENCE, Ann. Mtg., Capitol Univ., Columbus, Ohio. Trip of Devonian & Mississippian in Columbus area.
- April 24-25—SEPM: Pacific Section, Annual Spring Field Trip, Boulder Creek area, Santa Cruz Mountains, Calif. Write: A. A. Almgren, P. O. Box 1031, Bakersfield, Calif.
- April 25—ILLINOIS STATE ACAD. OF SCIENCE, Field Trip.
- April 30-May 2—FORT SMITH GEOL. SOC., Field trip to pre-Atoka & post Morrow of NW Arkansas. Write: Shields, Box 1037, Fort Smith. Guidebook.
- May 2—ILLINOIS STATE GEOL. SURV., trip to Hardin area of Calhoun Co., Illinois.
- May 8-9—NEW YORK STATE GEOL. ASSOC., trip to Mid Devonian of central New York. Write: Cole, Cornell Univ., Ithaca. Guidebook.

May 8-9—CORPUS CHRISTI GEOL. SOC., field trip to Miocene through Edwards fm. of SW Texas. Write: Box 1068, Corpus Christi.

May 9-10—MIDWEST FRIENDS OF PLEISTOCENE, field trip of Pleistocene & pre-Cary of west-central Wisconsin. Write: Black, Univ. of Wisconsin.

May 15-17—FIELD CONF. OF PENN. GEOL., field trip of glacial geology of Erie & Crawford co's. Write: Lytle at 300 Liberty St., Pittsburgh 22. Guidebook.

May 16—ILLINOIS STATE GEOL. SURV., trip to Wilmington area of Will, Kankakee & Grundy Counties, Illinois.

May 20-23—PANHANDLE GEOL. SOC., field trip of struct. & stratig. of NE New Mexico & Raton Basin. Write: Carver, Box 2473, Amarillo, Tex. Guidebook.

June 12-14—MICHIGAN BASIN GEOL. SOC., field trip to Mackinac Island, Mackinaw City area and Rogers City quarry.

Aug. 12-15—BILLINGS GEOL. SOC., field trip of Sweetwater arch & disturbed belt near Great Falls and Helena, Mont. Write: Busby, Box 1836, Billings. Guidebook.

Sept. 9-11—WYOMING GEOL. SOC., group field trips to Big Horn Basin, Wyo. Write: Leverett, Box 875, Thermopolis. Guidebook.

Sept. 10-12—ALBERTA SOC. OF PETR. GEOLOGISTS, 9th Field Conference. Technical session Sept. 10, trip to Moose Mountain Sept. 11, trip to Drumheller Sept. 12.

Sept. 10-12—IAPG: field trip and camp out in Wasatch-Uinta Mtns. area of Utah. Write: John Osmond, Box 34, Salt Lake City, Utah.

Sept. 12-13—FRIENDS OF THE PLEISTOCENE, Rocky Mtn. Sect., field trip to Wind River Mts., Pinedale, Wyo. Write: Richmond, Denver Federal Center.

Sept. 13—ILLINOIS STATE GEOL. SURV., field trip to Silurian of Whiteside and Carroll Co's., Ill.

Sept. 17-19—ROCKY MOUNTAIN ASSOC. GEOL., field trip of Cretaceous of western Colo., a Cretaceous symposium of Colo. Write: Kretz, 722 Patterson Bldg., Denver. Guidebook.

Oct. 4—ILLINOIS STATE GEOL. SURV., field trip of Coal Measures of Clark and Edgar Co's.

Oct. 18—ILLINOIS STATE GEOL. SURV., field trip of Coal Measures of Washington Co., Ill.



## ILLOGICAL GEOLOGY

by KENNETH K. LANDES

The double standard which we use for the behavior patterns of continents and ocean basins is illogical geology at its worst. We think nothing of depressing the continent floor on which the Gulf Coast sediments have been deposited twelve miles or of elevating the marine limestones of Mount Everest five plus miles, but when a layer of fresh-water diatoms is found at a depth of a little over two miles in the mid-Atlantic we shut our eyes to the obvious vertical drop and instead try to move these diatoms to their present position by pure magic.

In case you haven't been reading *Science* lately, Kolbe,<sup>3</sup> an authority in diatomology, described fresh-water diatoms in deep sea sediments, collected in the mid-Atlantic close to the Equator. Over 60 fresh-water species were found; the most abundant (*Melosira granulata*) ran as high as 3600 valves to a single slide. One level in core 234 "deserves special mention; it contained fresh-water diatoms exclusively, the only exception being a single fragment of a marine form. With regard to diatoms, this level gave the impression of belonging to a fresh-water sediment. In addition to the ever-present *Melosira granulata*, as many as 17 fresh-water species could be observed in this level. This 'fresh-water community' seemed to be confined to a thin stratum; the next higher level contained only a few individuals of *Melosira granulata* and the usual marine assemblage, while all the levels below this thin stratum and down to the end of the core were totally devoid of diatoms." (p. 1054.) That this thin bed, containing thousands of fresh-water diatoms to one fragment of a marine form could have slid, slumped, flowed, or blown into place is simply unbelievable. If there ever was a bed *in situ*, this is it.

Upon receiving a suggestion (made no doubt without knowledge of the local topographic environment) that this occurrence might be due to turbidity currents, Kolbe responded in part as follows: "Even if we should accept the faint possibility of a tur-

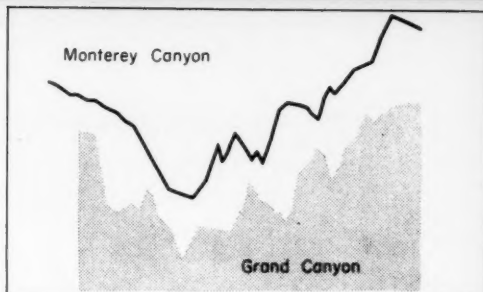


FIGURE 1. Cross section showing in comparison the profiles of the Monterey submarine canyon off the coast of California and the Grand Canyon of the Colorado River (after Shepard).

bidity current flowing from the African coast and dumping its load of fresh-water diatoms at a distance of 930 km from this coast, it remains to be explained how it was possible for this current not only to carry its load such a distance but, at the same time, to climb uphill more than 1000 m before dumping the load on top of a submarine hill.<sup>7a</sup>

Although fresh-water diatoms at the bottom of the sea may (or may not) be a freak occurrence, there is nothing freakish about the submarine canyons which are exact duplicates of subaerial canyons, but which a large segment of geologists prefer to blame onto submarine turbidity currents rather than onto rivers draining emergent sea floor. Figure 1 is a well-known and oft-used pair of cross sections (originally published by Shepard)<sup>4</sup> showing the Monterey submarine canyon off the California coast and the Grand Canyon. Both are cut in part into granite. What role did the Colorado River (itself a turbidity current!) play in the cutting of the Grand Canyon? *It was merely the flushing agent.* Decomposition and disintegration by subaerial weathering agents broke the rock down into fine enough particles to be flushed. Are the physical agents of disintegration, such as freezing and thawing, heating and cooling, active in Monterey Canyon? Decidedly not. What about the chemical agents of decomposition? The oxygen chemically combined with hydrogen is not available for oxidation. The percentage of dissolved oxygen in sea water, especially at depth, is insignificant compared with its percentage in the atmosphere. How was the submarine rock broken down so that it could be flushed?

Can we, as seekers of truth, shut our eyes any longer to the obvious fact that large areas of sea floor have sunk vertical distances measurable in miles? Why not accept this, and devote the cerebral horsepower now being wasted on futile attempts to explain away the truth to finding out the mechanism which produces these drastic sea-level changes?

<sup>1</sup>Excerpts from talks on "Our Shrinking Earth" given at the Annual Sigma Xi Baquet, V.P.I. Chapter, Blacksburg, Virginia, May 23, 1958, and before the Israel Geological Society, Jerusalem, Israel, August 26, 1958.

<sup>2</sup>R. W. Kolbe, "Fresh Water Diatoms From Atlantic Deep Sea Sediments," *Science*, Vol. 126 (22 November 1957), pp. 1053-1056.

<sup>3</sup>"Turbidity Currents and Displaced Fresh-Water Diatoms," R. W. Kolbe, *Science*, June 1958, p. 1505.

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## GEOLOGY in the Public Eye

by  
Robert L. Bates

Last October, mention was made here of the book *Earth's Shifting Crust*, "by C. H. Hapgood (who he?)." A digest of the book, with a large photo of the author suitable for framing, appeared in the *Satevepost* for Jan. 10. The article is billed as an "adventure of the mind." It sure is . . . If you don't like the Hapgood hypothesis, or Hap hype, of the effect of glaciation, try a new book, *Those Astounding Ice Ages*, by one D. E. Hooker of Akron, Ohio (Exposition Press, \$3.50). This book, according to the blurb, "can readily be understood by the layman," who can rejoice as the author "eliminates scientific frustration due to complete vacuum of new concepts and blind adherence to old refuted ones." And high time, too . . . News releases from Columbia and Caltech indicate that these institutions are doing a first class job of supplying factual material to newspapers. Of course it helps that they both have something of public interest to report, what with Maurice Ewing and the IGY at one end of the country and C. F. Richter and earthquake prediction at the other . . . There's a new tourist guidebook of the New Mexico series; it's by Roy Foster and covers some of the Zuni Mountains country. Director A. L. Thompson of the State Bureau of Mines states that reprinting of the earlier guides has been necessary and that much interest is shown in the series . . . The Louisiana public eye is being affronted by a new windshield sticker made up by the undergraduate geology club at LSU. It features a simian creature, reportedly modeled on Professor Don Kupfer, involved with pick, Brunton, tape, and trilobite . . . West Coast rockhounds have two new aids: *Rocks and Minerals of California and Their Stories* (Naturegraph Co., \$2.75), and a booklet *Radioactive Deposits in California* (Calif. Div. Mines, \$0.50) . . . Handyism of the month, by the editor of *Screenings* of the Iowa State Soil Research Lab: Neanderthal man was "more reminiscent of types seen among one's in-laws than those occupying one's own side of the family." Handyism of last month: "If you don't believe in surface tension, try blowing corners on a soap bubble." . . . If the Fentons' beautiful new volume, *The Fossil Book*, doesn't catch the public eye, nothing will.

## GRADUATE AWARDS POLICY

**Statement of policy for  
departmental chairmen, graduate deans,  
and other administrative officers**

Member institutions in the Association of American Universities and the American Association of Land Grant Colleges and State Universities award graduate scholarships and fellowships on April 1 for the following academic year, and the actual or prospective graduate student has until April 15 to accept or reject such an award. Appointments to graduate assistantships may be offered prior to April 1. When an institution offers an award or appointment to a prospective graduate student after April 15, it should remind him that, if he has a previous commitment, he may not accept the offer without first obtaining a formal release for the purpose.

The members of the Association of Graduate Schools in the Association of American Universities, the members of the Council on Graduate Work in the American Association of Land Grant Colleges and State Universities, and approximately thirty other graduate schools in North America have joined in approving the resolution enclosed with this statement. A copy of this resolution should accompany each offer of a graduate assistantship, scholarship, or fellowship sent to an actual or prospective graduate student.

**GLOSSARY OF GEOLOGY AND RELATED SCIENCES**, J. V. Howell, Coordinating Editor, 325 pages, 1957, \$6.00.

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International cooperation is widely acclaimed today. It can be useful in many ways, even in the exchange of educational films. Deterrents here, however, are government customs and other regulations.

Recently two 16 mm. geologic movies, loaned by a Canadian government bureau to a U.S. university for classroom use, and shipped by "prepaid express," reached their destination in "customs bond" during school vacation. When they were claimed a few days later, there was a \$2.25 "brokerage fee for handling the shipment through customs," a \$15 charge for "shipment to the storage warehouse," and a \$7 fee for "storage." A sympathetic customs inspector waived the warehouse and storage charges, but could do nothing about the brokerage fee. Then after five different forms had been completed and signed, the films were opened, inspected, and turned over to the addressee.

The return journey to Canada a few days later via parcel post was somewhat less eventful, and fewer forms were required, but a later letter acknowledging receipt said delivery was "not without the usual difficulty experienced with the Customs Office."

Until customs and shipping regulations permit easy inexpensive exchange of educational films across international boundaries, little use will be made of material available in other countries.

### FILMS OF INTEREST

● **RAINBOW'S END**. 16 mm. Sound. Color. 29 minutes. Bush prospectors search for gold in the Canadian north woods, endure hardships, and make a successful strike. Animation is used where needed to review the geologic history of the region. Useful for classes in field methods and economic geology. DISTRIBUTOR: Ontario Dept. of Mines, Parliament Bldg., Toronto 2, Ontario, Canada.

● **RIVER OF THE KINGS**. 16 mm. Sound. Color. 28 minutes. 1958. From the Kings River in California comes water for power and irrigation. Here is the story of this river's history and development, from dams in the Sierras to irrigation canals in the San Joaquin Valley. For engineering geology classes. DISTRIBUTOR: Pacific Gas and Electric Co., 245 Market St., San Francisco 6, California.

## EARTH SCIENTISTS RECEIVE FELLOWSHIPS

The National Science Foundation awarded 302 Science Faculty Fellowships for the fiscal year 1959 and 82 Senior Postdoctoral Fellowships. Six (6) of the 302 (2%) Science Faculty Fellowships went to earth scientists, and 4 of the 82 (5%) Senior Postdoctoral Fellowships were awarded to earth scientists. The recipients are listed below.

These awards carry stipends adjusted to approximate the regular salaries of the

recipients and apply toward study and research in an accredited nonprofit institution of higher learning in the United States or in a nonprofit institution of higher education abroad.

The programs will be opened in May to receive new applications for fellowship awards to be made in December 1959. Interested persons should address inquiries to the *National Science Foundation, Washington 25, D. C.*

FELLOW	PRESENT INSTITUTION	FELLOWSHIP INSTITUTION
	Science Faculty Fellowships	
Frank R. Beck	Lamar State College of Technology	University of Colorado
Josiah E. Colcord, Jr.	University of Washington	Ohio State University
Thos. M. Griffiths	University of Denver	University of Stockholm (Sweden)
Abe S. Margolin	Phoenix College (Arizona)	University of Washington
Raymond C. Staley	University of Texas	University of Washington
Charles P. Thornton	Pennsylvania State University	Univ. of California (Berkeley)
		University of Colorado
		University of Hawaii
	Senior Postdoctoral Fellowships	
William L. Donn	Brooklyn College	Columbia University
Frederick J. Kuellmer	New Mexico Bureau of Mines and Mineral Resources	Eidgenossische Technische Hochschule (Switzerland)
John Rodgers	Yale University	College de France
Aaron C. Waters	Johns Hopkins University	Oregon State College

### Popular Geology in Print

by Mark W. Pangborn, Jr.

Any review of recent popular paleontology literature will naturally lead off with *Carroll L. and Mildred A. Fenton's* impressive *THE FOSSIL BOOK, A RECORD OF PREHISTORIC LIFE* (Doubleday, 1958, \$12.50). Serious high school students and adults will find this 482 page, magnificently illustrated volume most useful as an encyclopedia of ancient life, for, though it systematically ranges from Precambrian protists to Ice-age mammals, it lacks the continuity of, say *Colbert's EVOLUTION OF THE VERTEBRATES*; a glossary and annotated bibliography are provided.

*Edwin H. Colbert's* *MILLIONS OF YEARS AGO: PREHISTORIC LIFE IN NORTH AMERICA* (Crowell, 1958, \$2.75), is another fine book by a paleontologist whose popular writings show imagination and hard work. Youngsters 10 to 14—and their parents—will be charmed by the author's account of fossil hunting, followed by a number of

"scenes" in which prehistoric animals are described in their environments. Mrs. Colbert's illustrations are delightful.

Still other books for the same audience are *William E. Scheele's* very well illustrated and well-written *ANCIENT ELEPHANTS* (World, 1958, \$2.50), *Dorothy Shuttlesworth's* *THE AGE OF REPTILES* (Garden City Books, 1958, \$2.50), a flashily illustrated survey of Mesozoic life and happenings, and *Jane Werner Watson's* *PREHISTORIC ANIMALS* (Simon & Schuster, 1958, \$5.00), in which the famous paintings from *LIFE* are not too well coordinated with the text.

For younger readers, 8 to 11, *Bruno Frost's* *CHILD'S BOOK OF PREHISTORIC ANIMALS* (Children's Press-Maxton Publishers, 1956, \$1.50), features good pictures and informative text, as does *Anna Pistorius's* simple *WHAT DINOSAUR IS IT?* (Follett, 1958, \$2.25).

An attractive new pamphlet is *THE DINOSAUR QUARRY, DINOSAUR NATIONAL MONUMENT, COLO.-UTAH* (Govt. Printing Office, 1958, \$.25); in it *John M. Good* and other National Park Service experts reveal the wonderful Jurassic life of the area, and explain how the skeletons have been exposed, in bas-relief, for public exhibition.



THE EARTH AND ITS ATMOSPHERE, *edited by D. R. Bates, Basic Books, Inc., 59 Fourth Avenue, New York 3, N. Y.*

Published first as *The Planet Earth* by Pergamon Press, in Great Britain, 1957, this book presents the best descriptions of the earth and its environments to be found in one volume. In seventeen chapters written by fifteen outstanding scientists there is presented in concise and lucid manner the exciting facts, as we now know them, about the atmosphere, oceans, crust, core, and numerous physical phenomena associated with our planet. For both layman and scientist this is probably the best single reference for providing an accurate and integrated background to all of the earth sciences.

RMF

UPPER AND MIDDLE TERTIARY OF BRAZOS RIVER VALLEY, TEXAS, *by Fred E. Smith, Guidebook for Annual Field Trip, Gulf Coast Section of SEPM and the Houston Geological Society, December 6, 1958. Houston Geological Society, 234 Esperon Building, Houston, Texas. \$3.25*

The field trip covered by this Guidebook started at Independence in Washington County, Texas, on the outcrop of the Miocene Oakville formation and followed along the Brazos River, visiting a total of nine excellent outcrops, and ending at the Weches-Sparta contact of the Eocene Claiborne near Burleson Bluff on the Brazos River. Both a geological map and a highway map of the area are included as well as idealized and columnar sections, air photographs, an illustrated road log, and an annotated bibliography. Professor Smith, A & M College of Texas, College Station, Texas, the principal author, was aided by petroleum geologists and paleontologists associated both with the SEPM and the Houston Geological Society. The Guidebook is complete and authoritative. A second Guidebook is to be issued for a field trip to be conducted in the Spring of 1959, continuing up the Brazos River, covering the remaining Cenozoic formations and continuing through the upper Cretaceous into the lower Cretaceous. The two Guidebooks will provide complete coverage of the Tertiary and Mesozoic section as it is exposed across the lower Gulf Coast of Texas.

SUBSURFACE GEOLOGY IN PETROLEUM EXPLORATION, *a symposium, edited by John D. Haun and L. W. LeRoy, published by Colorado School of Mines, Golden, Colorado, 1958, 887 pp., \$10.00*

This volume is an outgrowth of "Subsurface Geologic Methods" compiled by L. W. LeRoy and first published in 1949; however, many new subjects have been added in the present edition whereby the reader receives the impression that no significant aspect nor facet of the subject has been omitted.

The book is organized in logical sequence and thereby achieves a versatility of application in that either the student in using it as a text or the experienced subsurface geologist using it as a reference manual will be equally benefited.

The contribution of each author is terse but comprehensive with supplemental references enabling the reader to readily pursue the subject into its finer points.

Topics range from the expected, e.g., sample examination techniques to facies maps, to the unexpected, e.g., X-ray spectroscopy, thermoluminescence and turbo-drill operation. Included is a section on report writing which oil company administrators will hail with enthusiasm, as so often the technical graduate is capable of solving problems but lacks the ability to write so others may use the results of his prowess. The final chapter on exploration planning ties together many of the methods described into a cohesive program.

Illustrations are clear and generously included throughout. The binding is cloth, hard cover.

The timeliness of this volume is the key to its value in the field of subsurface geology which has developed so rapidly.

W.W.M. & H.S.M.

MINERALOGY AND GEOLOGY OF RADIOACTIVE RAW MATERIALS, *by E. Wm. Heinrich, University of Michigan, 654 pp., McGraw-Hill Book Co., Inc., New York, 1958, \$14.50*

Both a reference and a sourcebook in the mineralogy and geology of uranium and thorium, this publication should also prove useful as a supplementary text for students of economic geology.

The book is divided into two sections devoted to the mineralogy of the radioactive raw materials and to the geology of radioactive mineral deposits. The mineralogic classification follows the pattern established in the U. S. Geological Survey's Glossary of Uranium and Thorium-Bearing Minerals. The radioactive minerals are

divided into three categories: 1) uranium and thorium minerals; 2) minerals with minor uranium, thorium, or radium; and 3) minerals with radioactive impurities. Within each category the mineral species are subdivided into groups according to composition (oxides, carbonates, sulfates, etc.).

In the second section the mineral deposits are classified by genesis, based on conditions of decreasing temperature and pressure surrounding their formation. Thus, in logical sequence the book covers syngenetic deposits in igneous rock; pegmatite and carbonatite deposits; hypothermal, mesothermal, and epithermal deposits; epigenetic stratiform deposits in sedimentary rocks; uraniferous phosphorites and black shales; placer deposits; and deposits formed by weathering and groundwater action.

The book is a valuable addition to the literature on uranium and thorium. While the classification of some of the deposits described may be open to debate, as the author readily admits, the discussion is usually complete and balances the author's preference for certain pigeonholes. The chapter on epigenetic stratiform deposits in sedimentary rocks contains a particularly thorough treatment of the Colorado Plateau deposits.

The value of the book as a reference volume is enhanced by a lengthy bibliography, an index of mineral species, an index of localities, and a subject index. As an appetizer for the meaty diet within the book, the author offers, above each chapter heading, a quotation from some literary or popular source.

J.K.H.

#### UTAH STUDENT WINS AIME AWARD

The national prize paper award of the A.I.M.E. at the graduate level has been awarded to Charles H. Pitt, who is specializing in metallurgy at the University of Utah. This marks the third time in the last four years that a student of the College of Mines and Mineral Industries of the University of Utah has won the prize. The previous award winners were Carl Austin in Geological Engineering and William M. Dolan in Geophysics.

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## ROCK CHIPS

by SANDSTONE SAM

The motto of the 9 to 5 scientist: "If you don't first succeed—try something easier."

Susan B. Anticline reports that a well known consulting geologist asked the mayor of a small upstate New York State metropolis, "Does your city use ground water?" Quipped the mayor in reply, "Of course not, it's already the finest water around." (Comment: Really Suzie, if they had this corn in Kentucky it could be bottled and sold. SsS)

"The Cache Creek fault runs rapidly westward and disappears into Jackson's Hole." This rapidly running fault has been reported by a student in Wyoming, but friend Hapgood of SATEVPOST fame reports rapid-moving faults to have the crust of the earth in a cataclysmic turmoil.

Stratigraphic Trap: Is a political impasse which prevents the rise of the volatile geoscientist to the higher echelons of a company's strata.

#### 100 YEARS (Continued from page 9)

random drilling, geology came to play a part in the thinking and plans of most companies.

About the same time the big anticlines in California were drilled, also with spectacular success. Many anticlines in the Rocky Mountain intermontane basins had been mapped by the U. S. G. S., and these were quickly leased and drilled by the oil companies, also with great success. One of the more notable jobs of the U. S. G. S. was the mapping of Osage County, Okla. by K. C. Heald and a group of assistants in 1915. Almost all the geologists in the group later had distinguished careers in the oil industry, and one of the instrument men became President of the Standard Oil Co. (N.J.).

The Royal Dutch Petroleum Co. first became active in Sumatra about 1890, and employed Italian, Swiss, and American geologists beginning in 1898. Many geologists with experience in Indonesia explored for Shell in the U.S., South America, and Mexico. A regular geological department was organized at the Hague by Dr. J. Th. Erb in 1912 (23).

By 1930 geology had taken its place in



the industry, and few oil companies were without geological departments. In fact, geologists began to diversify and specialize.

#### PALEONTOLOGY

Paleontology had been an important branch of geology since the early 1800's, and the first oil geologists used fossils to identify rocks. In the early 1900's J. A. Udden studied samples of wells drilled for oil and water in Illinois. He moved to Texas and about 1914 recognized the value of foraminifera in oil geology, because since they were such small fossils they were still intact and recognizable in the drill cuttings. About the same time J. A. Cushman studied microfossils from a well at Charleston, South Carolina, and began intensive studies of foraminifera. The first full-time micropaleontologists were employed by the Humble and Río Bravo oil companies in Texas between 1919 and 1921.

An important recent development in petroleum micropaleontology is the use of fossil spores, pollen, and other very small fossils which can be extracted from cuttings with hydrofluoric acid. These forms were first used in Europe by students of coal, and later in the U.S. by geologists interested in glacial climates. They were first applied to oil geology in Venezuela by Shell about 1939 and later by the Creole Petroleum Co.

(to be concluded in the next issue)

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# LETTERS

DEAR EDITOR:

The book *Earth's Shifting Crust* received a rather kind review (discounted by the Editor's note) in your October issue, and doubtless many lay readers are intrigued by Mr. Hapgood's stirring article in a recent issue of *Saturday Evening Post*. The Hapgood-Campbell concept has some glaring weaknesses from a geologist's viewpoint, and evidence from studies of remnant magnetism shows conclusively that large-scale shifts of the Earth's crust *did not occur* during the Pleistocene ice ages. An article by E. Irving summarizes results from widespread research in paleomagnetism. Irving, now in the National University at Canberra, Australia, was a student and co-worker of S. K. Runcorn and is one of the leading workers in his field. His present article substantiates and reinforces the earlier findings.

A catalogue of measurements on rocks dated as Recent, Pleistocene, and Late Tertiary indicates no appreciable change in location of the magnetic pole. If the crust had shifted through thousands of miles only a few thousand years ago, as claimed by Hapgood, magnetic observations on rocks of earlier date would show sharp discordance with the present magnetic field. Evidence of "polar wandering" is reported only from rocks formed at least 20 million years before the latest ice age. As the crust did not shift during Pleistocene time, when asymmetric ice caps had their ideal opportunity, the Hapgood-Campbell mechanism is "out the window."

CHESTER R. LONGWELL

DEAR EDITOR:

Well, you finally caught me and since I don't, by all means, want my subscription to *GeoTimes* to expire, enclosed is my \$2 for a non-member subscription. Although not actively engaged in the related geological sciences, I find *GeoTimes* is the only magazine by which I can keep up with the problems in the field. Too bad there isn't a member organization for Lawyers or Law School students who have BA's in Geology and are in or are going into natural resources work.

Huzzas to Robert Bates on his latest GEOLOGY IN THE PUBLIC EYE column, and also to Mr. Meyerhoff on MAN-POWER. Seems to me that until the pro-

fession gets off the fence or builds that bridge to Pubedproregore land you won't be able to print anything but complaints. Granted, recent geology graduates have had a rough time getting a job, but perhaps one of the faults is the schools which prepare a man for the field or the lab only. Until more schools follow Stanford's plan (Sept. issue, p. 8) especially point number two: "Confine specialization to the graduate schools," and prepare a geologist for the business world, not just the oil well, there will continue to be unemployment. Seems to me that a well-rounded man would be able to shift within his company when a cut-back came, instead of being out in the cold. At any rate, if there were more graduates from liberal arts colleges among the men in the profession, there would also be more concern, interest and action in the public relations field.

KARL F. ANUTA  
Law School  
University of Colorado  
Boulder, Colorado

DEAR EDITOR:

I have moved again as do so many fellow geologists. This makes four moves within the last year and a half. However, I certainly would not want to miss the *GeoTimes*. Even my wife enjoys looking at this trade magazine. This way she can always suggest a new part of the world we haven't seen as suggested by your ads.

During the years you have listed—"please send dollars," I was unable to comply. At that time I was a student asking of others the same request.

I am enclosing a small contribution to express my appreciation for a marvelous job. I hope to continue the same policy from time to time.

Yours truly,  
E. G. WERMUND, JR.

DEAR COLUMNIST BATES:

I have just received the last *GeoTimes*, and cannot wait to add a rousing AMEN to your delicious satire. I predict that this will really get response—and I hope you are able to report a ground swell towards putting geology in the same class with the other sciences. I, for one, would not hesitate to spend \$5.00 a year for a monthly publication triple the size of our present

*GeoTimes*, if it were of the same provocative character as the present exceedingly stimulating publication. I would hate very much, however, to see it lose the light touch in becoming bulkier in content. There is only too little humor in our day and age, I am afraid.

Enthusiastically,

JOHN ELIOT ALLEN

DEAR SAM & FRIENDS:

Get the price of a good cold beer somehow, I don't care how. Send the 15¢ to Superintendent of Documents, Washington 25. Tell him to send you "Farmers Bulletin No. 1972."

It is the best thing the Government published since 1776.

So long, Affectionately,

AN OLD ROCK HOUND

EDITOR'S NOTE: *We have checked and agree.*

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### VACANCIES

**GEOLOGIST**, Ph. D. with training in Paleontology. Other areas would be considered. Address applications to: Dr. Olin T. Brown, Chairman, Department of Geology, Mississippi Southern College, Hattiesburg, Mississippi.

**ENGINEERING GEOLOGIST** wanted by growing West Coast consulting firm. Minimum 10 years of experience mainly in heavy construction such as dams and tunnels. Must be able to write reports. Some overseas work. Send summary of training and experience, salary desired. Box 103.

**MINING EXPLORATION COMPANY** located in New England has the following openings:

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- (2) Geophysicist, Physicist or Electronics Engineer to develop systems of measurement and study earth phenomena.
- (3) Geophysicist interested in field exploration. Box 104.

**UNIVERSITY OF ALASKA**, College, Alaska. Opening September, 1959, for Ph.D. to teach mineralogy and petrography on undergraduate and graduate level in expanding State University. Assistant or Associate Professor depending upon qualifications. \$900.00 per month minimum salary for eight and one-half months academic year for Assistant and \$1000.00 for Associate. Apply with complete credentials to Head, Department of Geology, University of Alaska.

**LEHIGH UNIVERSITY**, Bethlehem, Pa. Sept., 1959 Undergraduate and graduate teaching in general area of stratigraphy and/or paleontology. Associated field(s) could include either paleoecology, micropaleontology, geochemistry, sedimentation or mineralogy. Interest in quantitative aspects and research desirable. Man preferably under 40 with Ph.D. State qualifications—training, experience, interests. Reply to Dean G. J. Christensen.

**MONTANA STATE UNIVERSITY**, Missoula, Montana, plans to add two staff members in September, 1959. Must have Ph.D.'s; will teach average of 8 credits per quarter; research encouraged in this young, growing department. Must have backgrounds in invertebrate paleontology or mineral deposits. Will teach those courses plus some allied courses and/or beginning courses. Write Chairman, Geology Department.

**NEW YORK UNIVERSITY** has an opening in the Department of Meteorology and Oceanography for the academic year 1959-60. A young man with Ph.D. is desired whose primary interest is geophysics with secondary interests in meteorology or oceanography. The appointment holds the rank of Assistant Professor. Contact: Chairman, Department of Meteorology and Oceanography, New York University, College of Engineering, University Heights, New York 53, New York.

**UNIVERSITY OF NORTH DAKOTA**—Grand Forks, North Dakota. Assistant Professorship beginning September 1, 1959. Ph.D. required. Area: General Geology, Structural Geology and Regional Geology. Write Wilson M. Laird, Head, Department of Geology.

**HARD ROCK GEOLOGIST**, M.A. or Ph.D., for a one-year only teaching appointment at a west-coast University beginning July 1959. Salary—\$4980. Box 105.

**SEDIMENTOLOGIST**: Ph.D. Minimum three years experience. To do research in newly organized geological research section of major oil company. Prefer some experience with modern sediments and micro-paleoecology. Box 106.

**DARTMOUTH COLLEGE**, Hanover, N. H. Glacial geologist-geomorphologist for an opening in September, 1959. Ph.D. required. Preference to younger men. Salary and rank dependent on qualifications.

**EXECUTIVE SECRETARY**, Ohio Academy of Science, M.Sc. or Ph.D. in science; administrative ability; teaching experience; initiative; affable; willing to travel some. Full-time position implementing Junior Division program and programs for improvement of science teaching, teacher certification, science libraries, science-industry liaison in Ohio. Attractive salary. Write for application form. Dr. George W. Burns, Secretary, Ohio Academy of Science, Ohio Wesleyan University, Delaware, Ohio.

**TEACHING POSITION** requiring Master's or Ph.D. degree and ability to teach undergraduate courses in mineralogy, petrology, structural, and economic geology. Rank and salary dependent on qualifications. Prior experience desirable, but not essential. Write: R. E. Janssen, Chairman, Dept. of Geology, Marshall College, Huntington 1, W. Va.

**APPLICATIONS** are invited for the position on the staff of the Department of Geology in the rank of Assistant Professor on the salary scale \$5400-100-7000 to teach paleontology and stratigraphy. Contribution by the University up to \$750 made towards moving expenses. Curriculum Vitae, a recent photograph and the names of three referees should accompany the application to the President of Memorial University of Newfoundland, St. John's Newfoundland.

### POSITIONS WANTED

**BOX 398. WHO NEEDS A** 29 year old, married exploration geologist with varied mineral deposit experience who can write? Has written articles and reports for all levels of geological interest and knowledge. Open to any attractive offer.

**BOX 481. RESEARCH PETROLEUM GEOLOGIST-STRATIGRAPHER**, 30, M.S. Extensive experience in most provinces U.S. and Canada. Have utilized newer exploration tools: Entropy Lithofacies mapping, Gamma-Halo surveys, porosity maps, moment maps, etc. Desire position of responsibility in research or exploration. Executive ability.

**BOX 483. PETROLEUM-GEOLOGIST**, M.S. 30. Diversified experience; subsurface, research, teaching. Knowledge of Texas, mid-cont., Rocky Mts., Appalachian, Canada. Creative thinker, aggressive, proven oil finder, capable of organizing or operating exploration or research group. Desire domestic or foreign position of responsibility.

**BOX 502. GEOLOGIST**, experienced explorationist with diversified background needs more responsible position. Experience includes subsurface studies, supervision and seismograph.

**BOX 517. PETROLEUM GEOLOGIST**, M.S., family, desires to relocate in Alaska. Diversified Arctic, Mid-continent, and Rocky Mountain experience. Currently employed by major oil company. Specialties include photogeology, surface and subsurface structure, stratigraphy. Creative thinker with leadership and administrative ability. Excellent references.

## POSITIONS WANTED—Continued

**BOX 527. STRATIGRAPHER-PALEONTOLOGIST.** Ph.D. before June 1959, 32, family. Four years varied petroleum experience, two years as university professor teaching historical, paleontology, stratigraphy. Research in Pennsylvanian-Permian microfaunas and stratigraphy. Will consider petroleum or teaching position. Resume on request. Available June 1959.

**BOX 529. PILOT-PETROLEUM GEOLOGIST.** 33, B.G., 2½ years experience with major company, both exploration and field work. Extensive flying experience with military air transports, both multi-engine land and sea. Presently flying with airline on equipment up through DC-6B aircraft. Desire position with expanding company needing aircraft and field geologist for wider range of operation, U. S. or overseas.

**BOX 536. GEOLOGIST, Ph.D., 30, family,** desires teaching and research position in college or university, or research work with petroleum company. Principal fields micropaleontology and stratigraphy. Also proficient in sedimentology and petrography. Industrial and teaching experience.

**BOX 547. GEOCHEMIST-MINERALOGIST, Ph.D., 34, married.** Desires academic position, preferably one that combines teaching and research. Interested in crystal chemistry, phase rule, and synthetic mineralogy. Experienced in experimental geochemistry, microscopy, and x-ray diffraction. Publications.

**R. P. NODDEN, GEOLOGIST, 28 B.S. in June 1958.** Single, veteran. Desires position where hard work will lead to advancement. Will work anywhere in U. S. or in foreign field. Box 457, Moncks Corner, South Carolina.

**BOX 548. GEOLOGIST M.S., Petroleum and Mining experience,** some Engineering Geology experience, some management, married, family, 7 years petroleum geology in Rocky Mountain area, subsurface, surface, some photogeology, well setting. Mining and Milling of metal ores, Nevada and Calif. 10 years experience, would consider most places in U. S.

**BOX 550. GEOLOGIST, M.S., (1955) 31, married,** urgently desires permanent domestic position in the fields of either petroleum geology, mineral industry, geologic survey work, or teaching. Good references and academic record. Graduate work in hardrock geology and petrographic microscope. Some professional experience with U. S. G. S. Three years employment by major petroleum company overseas, surface and subsurface. Resume on request. Will appreciate interview opportunity.

**BOX 551. LAWYER.** Do you need a man with arts and Law Degree to teach Economics and Law courses? Ten years successful teaching experience with legal practice and business background. Available, fall of '59.

**ECONOMIC GEOLOGY teaching post** wanted in small-medium size school by geologist, Ph.D., age 34, family. Fair teaching load and some research facilities preferred. Experience includes state survey work, 7 years with USGS (USA, Alaska, Philippines, Cuba), some teaching. Publications. Presently post-doctoral fellow at leading Midwest university. Available August 1959. Ronald K. Sorem, 1423 Vilas Ave., Madison 5, Wisconsin.

**BOX 552. GEOLOGIST, Ph.D., 34, married.** Desires permanent teaching position in small to moderate size school and town, preferably in south or west. Broad geological background in teaching and research, especially in sedimentary rocks, principles of stratigraphy, petroleum geology, and mineralogy. Presently employed as geologist by major oil company.

**BOX 553. ASSOCIATE PROFESSOR** on sabbatical leave from June 1, 1959 to September 1, 1960, desires temporary work with petroleum or associated company. Ph.D. and experience in Gulf Coast, Rocky Mountains, Great Basin, Canadian Rockies, and Alaska in detailed and reconnaissance mapping, photo-

geology, paleontology, and stratigraphic analyses, with limited but working knowledge of well site and subsurface methods. Prefer to work somewhere in North or Central America, but South America considered. References on request.

**BOX 554. ASSISTANT PROFESSOR, Ph.D.** major university wishes to teach in college or university in more desirable area. 3 yrs. teaching and 6 yrs. varied industrial experience. Primarily interested, paleontology, sedimentation, marine geology, mineralogy. Active researcher, member prof. societies. Available June 1959. Resume on request.

**BOX 555. GEOLOGIST, PETROLOGIST, MINERALOGIST, 27, single, Swiss, Ph.D. (Basel, honours), 7 years thorough education in all fields of Geology, Petrology and Mineralogy.** Extensive field and laboratory work. Mineral research and field experience in the Alps and in arctic regions. English, German, French, Italian, some Spanish and Danish. Excellent references. Desires position with oil or mining company in U. S. or overseas.

**BOX 557. GEOLOGIST, Ph.D., Swiss, married, 37, Swiss degrees, French, English, German.** 12 years experience in detailed and reconnaissance mapping, subsurface work, all phases of exploration and research for gold. Desires position for 2 years in U. S. in exploration for minerals. More interested in valuable experience than salary. Available in Fall 1959.

**BOX 558. GEOLOGIST, B.S. in geology, 27, veteran, sampling, geologic field training,** heavy in geology, mathematics, and science. Some M.S. work. One year subsurface petroleum experience, minor mineral experience. Desires responsible petroleum, mineral, or academic position.

**BOX 559. GEOLOGIST, M.Sc., 6 yrs. experience,** West Texas, Venezuela and Libya; interested in electric log analysis and interpretation, facies studies. U. S. G. S. rating G-11, will travel; excellent references. Interested in petroleum industry and/or teaching.

**BOX 562. PALEONTOLOGIST, Ph.D., 32, married, 4 years industrial and research experience, 4 years teaching experience.** Specialties geochemistry and paleogeology. Some experience in oceanography. Desires teaching position with time for research starting September 1959.

**BOX 563. GEOLOGIST, B.A., '56, Single, 24.** Experience: 1 year mapping, well core log-veteran, sampling, Western Phosphate Field (Montana) 1 year Asst. Geol. U. S. G. S. Europe doing field work, map compilation, and report writing. Active military service completed. Desire geologist or geophysicist trainee position. Will go anywhere.

**Box 564. GEOLOGIST, 31, BS, family.** Seven years experience in all phases mineral exploration, principally uranium. Desires challenging work and better chance for advancement. Written numerous reports and papers. Some supervisory experience in addition to research. Accustomed to dealing with the public. Domestic or foreign.

**Box 565. GEOLOGIST, M.S., 23, single,** summer field experience with major oil co. Good academic grades. Desires foreign or domestic work. Draft exempt. Available June 1959.

**Box 566. GEOLOGIST, Ph.D., 40, family.** Currently teaching with five years experience in mineralogy, petrology, economic geology, structural, and related courses. Wishes to relocate in teaching position.

**Box 567. SURFICIAL GEOLOGIST, 28, single, M.S., soils-testing experience,** seeks employment in New England.

**Box 568. GEOLOGIST, B.A. 1956, Veteran, 25, married.** Desires trainee position in any phase of Geology or allied field. Experience will be chief remuneration. No reasonable offer turned down. Foreign or domestic.

**PHYSICIST, GEOPHYSICIST, single, age 32,** desires employment in geophysical instrumentation design and development that eventually leads to responsible position. 44 hrs. Geology,



44 hrs. Math. 28 hrs. Engineering. 28 hrs. Physics. One yr. seismograph, 3 yrs. radio communications, 2½ yrs. guided missile simulation, analysis with analog computers. Min. \$7200/yr. Will consider special expeditions (research) on a separate basis, if interesting. W. L. Redish, 2309 Pecan Drive, Alamogordo, New Mexico.

Box 569. ASS'T PROF., Ph.D., 43, family, 7 years of geological College and University teaching. Considerable varied field experience. Prefers teaching Stratigraphy, Structural Geology, General Geology and Mapping. Looking for better teaching position and location in area of more varied geology than where presently situated.

Box 570. GEOLOGIST, Ph.D., now teaching, desires summer stratigraphic work on Upper Cretaceous of Rocky Mountain region.

Box 571. GEOLOGIST, ASS'T PROF. in State University desires permanent research position in stratigraphy and allied studies with petroleum company.

Box 572. GEOLOGIST, M.A., 30, married, experienced in subsurface investigation with sound academic knowledge in Soil Mechanics, desires position as Engineering Geologist or Soils Engineer. Interested in all phases of engineering geology. Will work domestic or foreign.

Box 573. GEOLOGIST, Ph.D., 30, publications, consulting, 8 years undergraduate and graduate teaching experience in various fields is interested in a one-year position; teaching, research or industry. Fields of major interest include: economic, structural, engineering geology and mineralogy. Will accept fill-in for sabbatical.

Box 574. SEISMOLOGIST, Party Chief, Geophysicist, 6 years broad geophysical experience, seeks more challenging position, better pay. Will consider foreign.

Box 575. GEOLOGIST, Ph.D., 31, family. Five years research-teaching experience. Desires permanent teaching appointment at school with at least moderate library and equipment facilities. Petrography-petrology, optical crystallography, mineralogy, structural and field geology. Some groundwater and sedimentary petrology. Publications. Available Sept. '59.

Box 576. GEOLOGIST, Ph.D., with several years experience in structure, stratigraphy and areal mapping. Desire teaching position in midwestern or western U.S.

Box 577. GEOPHYSICIST B.S. in Geophysics. Five and one-half years diversified experience in seismic computing and interpretation. Desire responsible work in geophysical interpretation. Willing to work anywhere, including foreign. Presently employed.

BOX 578. PETROLOGIST-SEDIMENTOLOGIST, 34, Ph.D. from leading University. Broad experience in all phases of sedimentation, petrography, mineralogy-crystallography, stratigraphy and geochemistry, also petroleum and structural geology. Active research in quantitative interpretation. Seeks teaching position in University or College. Excellent references, teaching experience, research publications.

Box 579. GEOLOGIST, Ph.D., 29, family, desires teaching position in good University or College. Principal interests: Stratigraphy, Structure, Tectonics, Sedimentology.

Box 580. STRATIGRAPHER - PALEONTOLOGIST, M.A., 28, two years experience. Desires summer work 1959 on a get-acquainted basis for permanent foreign or domestic work starting 1960. Now teaching. Resume on request.

Box 581. GEOLOGIST, M.S., May 1958, 27, married, veteran. Interest in all phases of Geology. Scant hydrogeochemical field survey experience. Presently engaged in missiles engineering work. Desire foreign or domestic position. Resume on request.

Box 582. GEOLOGIST, 37, B.Sc. Presently doing graduate work. Seven years experience domestic and foreign in Mineral Exploration and Mine resident work. Spanish. Available June. Excellent references.

Box 583. CONSULTING GEOPHYSICIST, B.S., 24 years experience in principal oil producing areas of United States. Specialist in seismic reflection interpretation. Outstanding record of successful oil and gas finding. Have concrete ideas concerning drilling prospects. Available on a full time basis or part-time retaining basis. Excellent health and references. Free to travel.

Box 584. GEOLOGIST, M.S., 27, married—5 years experience—surface and underground mapping, drilling, geophysics, geochemistry, land negotiations. Now head of exploration project in northern U.S. Will consider any position anywhere.

GEOLOGY MAJOR: Wants summer employment for experience. Will do anything. Phila. or Jersey shore preferably. W. Lohmann, Dickinson College, Carlisle, Pa.

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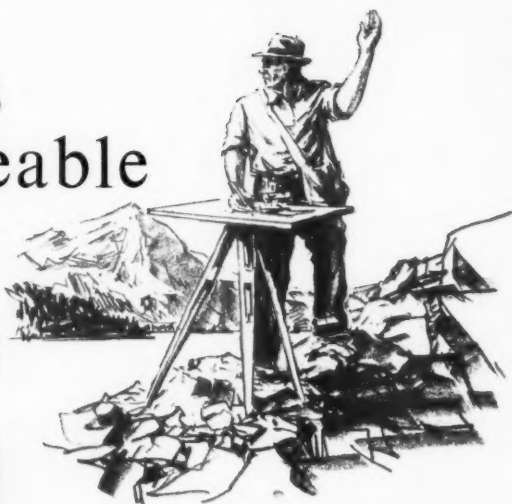
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